Space Weather Forecast

Issued on Saturday, 02 April 2022 at 13:05 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate Radio Blackouts and Geomagnetic Storms likely: the chances of the former falling gradually throughout, the latter more quickly over the current UTC weekend.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity again became moderate in the past 24 hours, with the peak X-ray flare for the period a Moderate-class observed from the ongoing most active sunspot in the northwest at 02/0256UTC. Activity was otherwise overwhelmingly common-class, with frequent small flares that increased in magnitude into the second half of the reporting period.

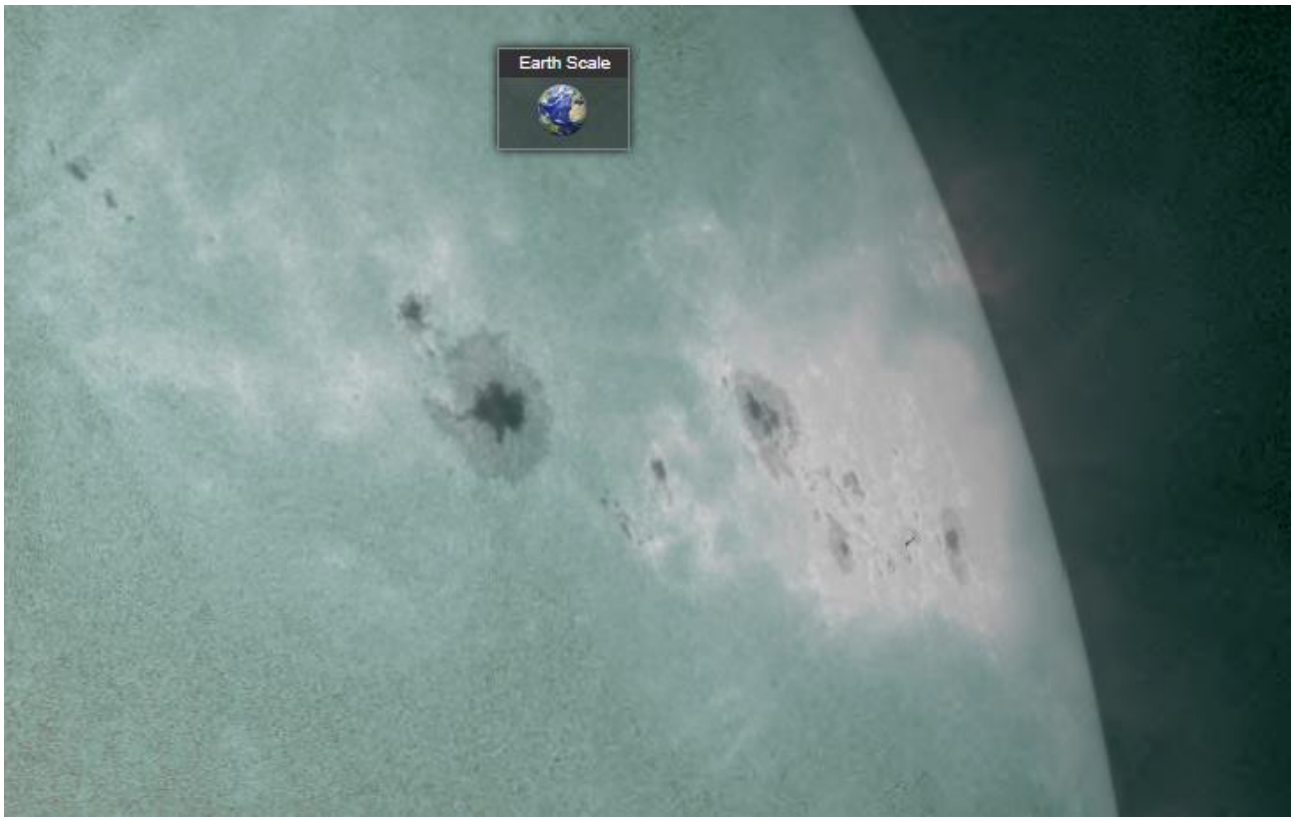

Figure 1: Composite image overlaying extreme UV imagery (a proxy for viewing the X-ray flare flare at 02/0256UTC) and the visible sunspots in the sun's northwest at that time. Image overlay courtesy of Helioviewer.org.

There are now seven sunspot regions on the facing side of the sun, with the most active remaining potent in the northwest quarter. This group appeared to show some decay in its intermediate spots during the first half of the 24 hours, but this reversed to a degree later. A new region also emerged

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immediately to the east of this spot, while a larger group still further east showed some leading spot development but was otherwise unremarkable.

Elsewhere on the sun, previous rapid intermediate spot growth in a pair of groups in the sun's southeast slowed, with a spreading trend taking over. Completing the roster of the Earth-facing side regions were a pair of minor unipolar sunspots near the eastern solar horizon.

There remain a number of 'filaments' (arcs of plasma) on the sun, including a large one spanning the central southern hemisphere and a briefly mobile one immediately west of the southeastern sunspot groups. At the time of writing, these all appeared to remain anchored in place. No Earth-directed Coronal Mass Ejections (CMEs) were observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind environment was characterised by the waning influence of the 28 March CME(s), possibly eventually transitioning around 02/0020UTC into a forerunner of a coronal hole fast wind-like environment. This ought to become clearer in the coming hours.

The solar wind speed was initially slightly elevated, but showed step-wise increases at both 01/1220UTC and again at 02/0020UTC to become elevated. The number of particles comprising the solar wind increased a little over the same interval, while their associated magnetic field smoothly decreased - all signs of a CME regime exit.

The net result of the above solar wind measures was a little disturbed, with a provisional Minor Storm G1 observed in the 03-06UTC interval.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, as protons continued their gradual easing towards background levels (from a peak of S1 in the wake of the 30 March X-class flare), staying below the S1-level throughout.

Four-Day Space Weather Forecast Summary

Solar Activity: Further moderate activity is Likely, primarily due to the most active sunspot of the past week but also the other large active regions. This risk reduces later in the period as the most active group disappears over the western solar horizon into the new working week UTC.

Solar Wind / Geomagnetic Activity: There is one potentially Earth-directed CME, from the strong-class X-ray flare on 30 March. Whilst this is low confidence, with some potential for the CME to miss or only give a glancing impact, arrival is currently expected 02/1400+/-10hrs. A coronal hole fast wind arrival is also expected day 1 (Saturday 02 April). This may already be in course and could perhaps combine with any CME arrival. Any ongoing CME and fast wind effects will then gradually wane into the start of the new working week UTC.

G1/G2 Minor to Moderate storms are likely on day one should both the fast wind and CME effects materialise. These have an ongoing potential through day two, Sunday 03 April, before a return to mainly quiet conditions thereafter.

Energetic Particles / Solar Radiation: Solar radiation levels should soon revert to background levels, but with a daily slight chance of rising above the S1 level, primarily from any further flare activity of the recent most active spot group, but also with any activity that develops from the other active regions. This risk gradually reduces as the active spot rotates over the western solar horizon later in the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	40	5	1
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	50
Very Active	R3 to R5 X	No	15	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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